



# SCIENCE UPDATE



**NAMRL MISSION: TO CONDUCT RESEARCH, DEVELOPMENT, TEST, AND EVALUATION IN AEROSPACE MEDICINE AND RELATED SCIENCES TO ENHANCE THE HEALTH, SAFETY AND OPERATIONAL READINESS OF NAVY, MARINE CORPS, AND OTHER MILITARY PERSONNEL.**

**FALL 2010**

## NAVAL MEDICAL RESEARCH UNIT- DAYTON ACTIVATION SETS STAGE FOR FUTURE NAVY MEDICINE RESEARCH

On October 6<sup>th</sup>, the Naval Medical Research Unit-Dayton (NAMRU-D) was officially activated at Wright-Patterson Air Force Base (WPAFB) beginning a new chapter in Navy Medicine's Operational Medicine Research and Development arena. The activation officially marked the merger of the Navy's Environmental Health Effects Laboratory (EHEL) and the Naval Aerospace Medical Research Laboratory (NAMRL). NAMRU-D's first Commanding Officer assumed Command. The keynote speaker recognized the merger as "the creation of a premier military operational medicine laboratory that will be able to answer a broad range of research questions from basic research to advanced technology development and beyond." The ceremony was also attended by key scientists and representatives from the 711 Human Performance Wing, NASA Johnson Space Center, University of Dayton Research Institute, Wright State University, Ohio-based small industry leaders, NAVAIR, and several DoD sponsors and customers. VIPs and staff toured the new 38,700 square-foot building, which will house NAMRU-D headquarters, and received an overview of the facility and its new state-of-the-art research devices. The Disorientation Research Device, Vertical Linear Accelerator, and Visual Vestibular Sphere Device are one-of-a-kind devices that will allow researchers to investigate the physiological effects of acceleration in both present and future motion platforms. Advanced Hypoxia, Fatigue, and Psychophysiological Laboratories are also being constructed for the new aeromedical research facility. These new facilities, combined with the former



**Unveiling of the Naval Medical Research Unit- Dayton logo**

EHEL's extensive environmental and toxicological research facilities, including state of the art nose-only and whole body inhalation toxicology laboratories, will provide NAMRU-D investigators with tools to address a wide range of operational requirements and provide innovative solutions to the fleet. NAMRU-D has aggressively pursued formal collaborations and agreements with local USAF laboratories and universities to ensure a quick research start for today and sustained success for the future. The new command is well on the way to becoming a cornerstone of the new DoD Aeromedical Joint Center of Excellence at WPAFB and one of Navy Medicine's premier aeromedical and environmental health research and development commands.

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## ACTIVATION CEREMONY (CONT. FROM PAGE 1)

WPAFB Color Guard

Assumption of Command

Ceremony Guests



## REDUCING THE THREAT OF WIRE STRIKES



**NAMRL Scientist delivers his presentation for the NAMRL Aviator Wire Strike Avoidance Training Module**

When flying in low level environments, impact with suspended wires continues to be a significant threat for both military and civilian pilots. Recent National Transportation Safety Board five year statistics (2005-2009) on wire strikes indicate that U.S. civilian pilots damaged, or destroyed, 79 aircraft by hitting airborne obstacles with a resultant outcome of 62 fatalities. To enhance mission performance by reducing the threat of wire strikes, the Naval Air Systems Command

(PMA205) funded NAMRL to research wire strike causal factors and produce training methods for reducing these types of mishaps. The primary objective of this six month effort was to couple scientific content and instructional methods with the latest proven technologies and theories related to pilot spatial perception of wires or other airborne obstacles. To meet the specific goals of the NAVAIR tasking, NAMRL conducted a thorough review of existing aviation data related to wire

strike mishaps and incidents. Based on the outcome of this analysis, NAMRL created learning objectives to guide the development of a wire strike avoidance training module aimed at increasing pilot capabilities for detection and avoidance of suspended obstructions. The finalized version of this teaching tool consisted of 19 enhanced media PowerPoint slides with imbedded videos and animations. Also included with the final product was a 4,600 word technical document with voice over, background text, and references that support the information displayed on the slides. To test and validate the quality and content of NAMRL's Aviator Wire Strike Avoidance Training module, the principal developer of this product presented the final training module to the Naval Survival Training Institute's (NSTI) Senior Directors. Post-presentation feedback for this product was very positive, and the final product for this effort was delivered to NSTI for integration into the Spatial Disorientation Training Program.

## NAMRL TEAMS WITH NAVAIR TO IDENTIFY UNMANNED AIRCRAFT SYSTEMS OPERATOR REQUIREMENTS

In 1995 NAMRL initiated the Navy's first systematic study of unmanned aircraft system (UAS) operator requirements, which ultimately led to the development of the DoD's first validated test to identify and select qualified candidates to fly UASs. That early study focused on the RQ-2 Pioneer, which at the time, was the Navy and Marine Corps' principal UAS. During the intervening years UASs in the Navy and Marine Corps have proliferated. From small systems such as WASP, to rotary wing systems such as Fire Scout, to armed systems such as UCAS-D, the variety of vehicles and missions is wide and growing.

The explosive growth in types and numbers of UASs in the fleet has produced significant human factors chal-

lenges, such as the need to develop effective personnel selection, training, and control station design solutions for a diverse range of UASs. To address this challenge, NAMRL has teamed with NAVAIR to conduct a comprehensive job-task analysis of all crew positions across a range of naval UASs, including Shadow, Raven, Scan Eagle, Fire Scout, BAMS, and UCAS-D.

The NAMRL-NAVAIR team is identifying the unique and common job requirements of crew members across UAS platforms. This information will help fleet customers design human factors solutions for a range of important applications. One such customer is NAVAIR's Naval Aviation Training Systems program office (PMA-205), whose

current tasking includes the development of a core UAS training curriculum. Information generated by the NAMRL-NAVAIR study will help PMA-205 determine which training tasks should be included in the core curriculum, and which should be included in specific UAS pipeline curricula.

Ultimately, the study will generate a database of UAS operator requirements that will inform many human factors developments in this growing warfighting domain. Among these will be the development of new and improved tests to select UAS operators across the range of naval UASs, a perfect capstone to NAMRL's pioneering role in Navy and Marine Corps' UAS crew selection research.

## NAMRL HOSTS ISRAELI SURGEON GENERAL

Israeli Air Force Surgeon General visited the Naval Aerospace Medical Research Laboratory (NAMRL) on 24 May during a tour of Naval Air Station Pensacola. NAMRL was one of several aeromedical institutions on his itinerary during a U.S. visit to gain insight into the U.S. military's approach to Aerospace Medicine. The morning began with a brief from NAMRL's OIC outlining Navy Medicine's structure and core areas of research and development, followed by an overview of NAMRL's mission, history, unique research capabilities, and technology transfer accomplishments. NAMRL Scientific Director briefed the Israeli Surgeon General on NAMRL's core competencies and emphasized the importance of using aeromedical mishap causal factors as drivers of research and development projects to ensure alignment of NAMRL efforts with fleet needs. The visit concluded with briefs from NAMRL Principal Investigators accompanied by a tour of NAMRL's Psychophysiology, Hypoxia, and Fatigue Laboratories.

**Israeli Surgeon General tours  
NAMRL's Hypoxia Lab**



## BRAC UPDATE

Excellent progress continues to be made on the MILCON project which is currently 5% ahead of schedule (94% actual versus 89% scheduled). Beneficial Occupancy Date remains 1 March 2011 and all members of the MILCON team remain confident that this milestone will be met. NAMRL is pursuing approval for early access to the building, 1 December 2010, to make preparations for the on-site installation phase of the Dis-

orientation Research Device. The device contractors for the Vertical Linear Accelerator and Visual Vestibular Sphere Device are scheduled to begin installation the second week of December and end of January, respectively. The goal is to have these two devices up and running by 1 March in order to achieve a seamless transition from NAS Pensacola to Dayton and minimize BRAC impact on critical research capabilities.



**The Corps of Engineers leads a tour of the new facility**

## CDR'S CORNER



I want to set the stage for my final CDR's Corner with a line from a famous singer- "the times they are a changin'". As I depart for my new position as Executive Officer of

Naval Medical Research Unit-Dayton, and complete the BRAC move of NAMRL to OH, it is difficult to not wax nostalgic, and at the same time, be filled with excitement about the future. NAMRL, under several names, has enjoyed a long and distinguished legacy of aeromedical research in the "Cradle of Naval Aviation" dating back to 1939. Whether executing research aimed at assisting NASA place the first man on the moon, or developing the best methods for selecting candidates to be naval aviators, or the invention of the Reduced Oxygen Breathing Device (ROBD) for safe and effective hypoxia training, NAMRL has delivered aeromedical and human performance solutions to answer a myriad of fleet and space program needs.

During my tenure as Officer in Charge, the scientific team has been keenly responsive to fleet requirements, continuing the storied NAMRL tradition. The research team has been prolific in delivery of products to sponsors and customers with substantial increases in both Products per Project and Products per \$100K. Highlights of this past year include awards for two projects, one regarding an intranasal countermeasure for motion sickness, and the other, an oral countermeasure for fatigue, both of which received the Naval Medical Research and Development Procedural Advancement Award from the Surgeon General at the inaugural Navy Medicine Research Symposium in April. NAMRL was also asked to provide a panel presentation "Aerospace Medical Research in Support of Warfighter Health, Safety, and Performance", to display our expertise in the areas of spatial disorientation, fatigue, hypoxia, pharmacological countermeasures, and acceleration/ vestibular sciences. While NAMRL's history and the past two years have truly been exciting, the winds of change are taking us from our Naval aviation roots in Pensacola, to the "Birth Place of Aviation" in Dayton, OH. One of the first steps in the BRAC transition oc-

curred with the command activation of Naval Medical Research Unit-Dayton (NAMRU-D) on 6 October 2010. This act officially marked the beginning of a new era. The transition of NAMRL to Dayton holds immeasurable promise such as; a new laboratory containing several one-of-a-kind research devices, collocation with the Air Force and the new research equipment they are bringing, and numerous partnering opportunities with local universities and small industry. This new page in NAMRL's history is the beginning of new possibilities, new research, and a new investment by Navy Medicine in the protection of our military warfighters. As a 1<sup>st</sup> century Roman philosopher stated, "Every new beginning comes from some other beginning's end." NAMRL and its mission are not ending; rather our move to Dayton is a rebirth and a new beginning with our historic roots intact.



**Naval Aerospace Medical Research Laboratory**

[www.med.navy.mil/sites/nhrc/namrl](http://www.med.navy.mil/sites/nhrc/namrl)

## NEW DIRECTIONS FOR PREVENTING PILOT DISORIENTATION

In June of this year, a NAMRL researcher presented ground-breaking safety flight information related to loss of in-flight spatial awareness to a large audience of Training Wing 6 (TW-6) crewmembers. Headquartered at Sherman Field onboard NAS Pensacola, TW-6 conducts primary, intermediate, and advanced Naval Flight Officer and Navigator training for the U.S. Navy, Marine Corps, Air Force, and select international students. The safety stand-down was conducted in response to recent spatial disorientation (SD) incidents and mishaps involving TW-6 aircraft. The safety stand-down coordinators re-

quested that NAMRL provide updated information and training on how to recognize and avoid this serious cognitive threat. NAMRL has been actively engaged in new research efforts related to SD, and utilized this opportunity to present its latest Enhanced Spatial Disorientation Training package to TW-6 instructors and students. The researcher provided flight crews with innovative information related to the methods by which pilots create and utilize multiple spatial strategies during various phases of flight. One of the main points stressed for prevention of SD was the importance of recognizing how primary spatial cues

created by outside horizon references will interact with secondary spatial cues generated from peripherally viewed cockpit images. Analysis of several recent aircraft accidents, including the recent Blue Angel mishap, was used to demonstrate how direct application of the theories and conclusions presented in the training package could be used to improve situational awareness in flight operations. The training was extremely well received and was another example of NAMRL's focus on transitioning bench science to the Fleet.

## INNOVATION, COLLABORATION ON DISPLAY AT NAMRU-D INAUGURAL RESEARCH CAPABILITIES SHOWCASE



**Symposium presenters and guests  
discuss current research**

On Wednesday, 6 October 2010, the Naval Medical Research Unit – Dayton (NAMRU-D) was activated, becoming Navy Medicine's newest Research & Development laboratory. NAMRU-D hit the ground running with a showcase of its cutting edge research capabilities on Thursday, 7 Oct, hosted by the University of Dayton Research Institute (UDRI). Posters, demonstrations, and presentations featured past, present, and future work from NAMRU-D researchers. In addition, multiple UDRI and University of Dayton (UD) labs featured their

work; and an impressive array of commercial, government, and University sponsored ventures within the Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST) was represented. Ground-breaking technology was a main attraction, including NAMRU-D's new one-of-a-kind Disorientation Research Device (DRD), state-of-the-art hypoxia, motion sickness and fatigue laboratories, and UDRI and IDCAST's facial recognition and terahertz lab capabilities. Innovative thinking for the warfighter was on display with information on NAMRU-D's inhalation and exposure surveys in Iraq and Afghanistan sharing space with IDCAST's next generation Unmanned Aerial System designs. Distinguished guests included representatives from Ohio's universities, commercial research enterprise, and the Navy's sister services. The new research synergies emerging from the interaction of these groups represent a unique set of capabilities for NMR&D enterprise. The meeting not only highlighted the Dayton region's fertile innovation environment, but also presented a clear picture of the path forward for Naval aeromedical and environmental health effects research. Built on the backbone of the Dayton region's existing scientific infrastructure, and in the best traditions of Navy Medicine, NAMRU-D presented itself as ready to support the current and future needs of the fleet from bench to battlefield.